

AMENDMENTS TO THE CLAIMS:

The following listing of claims will replace all prior versions and listings of claims in the application. Please cancel claims 40, 59, and 61 without prejudice or disclaimer; amend claims 19-25, 38, 39, 41-49, 52-58, and 60; and add new claims 63-73, as follows:

1. (Original) A heating unit for heating an object to be heated by irradiating a light onto the object, the heating unit comprising:
 - a plurality of lamps including at least one first lamp and a plurality of second lamps each having an irradiation area smaller than that of said first lamp; and
 - a lamp house having a first lamp accommodation part at a center thereof and a second lamp accommodation part surrounding the first lamp accommodation part so that said first lamp accommodation part accommodates said first lamp and said second lamp accommodation part accommodates said second lamps.
2. (Previously Presented) The heating unit as claimed in claim 1, wherein each of said second lamps generates an irradiation energy per unit area greater than an irradiation energy per unit area of said first lamp.
3. (Original) The heating unit as claimed in claim 1, wherein a number of said second lamps per unit area is greater than a number of said first lamps per unit area.
4. (Original) The heating unit as claimed in claim 1, wherein said lamps are detachably attached to said first and second lamp accommodating parts, respectively.

5. (Original) The heating unit as claimed in claim 1, wherein each of said lamps has a reflective part that reflects a light emitted by an illuminant thereof.

6. (Original) The heating unit as claimed in claim 1, wherein each of said lamps has a threaded part on a side surface thereof, and each of said first and second lamp accommodation parts has a threaded part engageable with the threaded part of each of said lamps.

7. (Original) The heating unit as claimed in claim 1, wherein each of said first and second lamp accommodation parts has a plurality of plates attached to an inner surface thereof so that the plates are located between said inner surface and each of said lamps, thereby holding each of said lamps by elastic deformation of said plates.

8. (Original) A heat treatment apparatus for applying a heat treatment to an object to be processed, the heat treatment apparatus comprising:
a support member on which the object to be processed is placed; and
a heating unit located above said support member so as to irradiate a light onto the object to be processed placed on said support member,
wherein said heating unit comprising:
a plurality of lamps including at least one first lamp and a plurality of second lamps each having an irradiation area smaller than that of said first lamp; and

a lamp house having a first lamp accommodation part at a center thereof and a second lamp accommodation part surrounding the first lamp accommodation part so that said first lamp accommodation part accommodates said first lamp and said second lamp accommodation part accommodates said second lamps.

9. (Withdrawn) A lamp applicable to a heat source for heating an object to be processed, the lamp comprising:

an electrode part to which an electric power is supplied;
a pair of first filaments connected to said electrode part;
a second filament connected to said first filaments and having a diameter smaller than a diameter of each of said first filaments,
wherein said second filament is configured and arranged to serve as a surface illuminant with respect to the object to be processed.

10. (Withdrawn) The lamp as claimed in claim 9, wherein said surface illuminant is parallel to the object to be processed.

11. (Withdrawn) The lamp as claimed in claim 9, wherein said surface illuminant has a convex shape protruding in a direction away from the object to be processed.

12. (Withdrawn) The lamp as claimed in claim 9, wherein said surface illuminant has a polygonal shape or a circular shape when viewed from the object to be processed.

13. (Withdrawn) The lamp as claimed in claim 9, further comprising a shield part that reflects a light emitted by said second filament, the shield part being located on a side opposite to the object to be processed with respect to said second filament.

14. (Withdrawn) The lamp as claimed in claim 9, wherein said second filament includes a first part facing the object to be processed and a second part farther from the object to be processed than said first part, and said first part has a work function lower than a work function of said second part.

15. (Withdrawn) The lamp as claimed in claim 14, wherein said first part has a cover film made of a material having a work function lower than a work function of a material of said second filament.

16. (Withdrawn) The lamp as claimed in claim 15, wherein said second filament is made of tungsten, and said cover film is made of thorium.

17. (Withdrawn) The lamp as claimed in claim 15, wherein said second filament is made of a material selected from a group consisting of platinum, connel alloy, tungsten and nickel, and said cover film is made of a material selected from a group consisting of barium oxide, strontium oxide and calcium oxide.

18. (Withdrawn) A heat treatment apparatus for applying a heat treatment to an object to be processed, the heat treatment apparatus comprising:

 a support member on which the object to be processed is placed; and

 a plurality of lamps located above said support member for heating the object to be processed, each of said lamps comprising:

 an electrode part to which an electric power is supplied;

 a pair of first filaments connected to said electrode part;

 a second filament connected to said first filaments and having a diameter smaller than a diameter of each of said first filaments,

 wherein said second filament is configured and arranged to serve as a surface illuminant with respect to the object to be processed.

19. (Currently Amended) A ~~lamp adapted to be used as a heat source heating~~ unit for heating an object to be heated, the ~~[[lamp]] heating unit~~ comprising:

a plurality of lamps used as a heat source, each of the lamps having an illuminant generating a light;

a lamp support part supporting the lamps; and

an illuminant generating a light; and

 an inner surface covering the illuminant so as to reflect the light generated by the illuminant,

 wherein said inner surface has a curvature so as to reflect the light generated by said illuminant in a direction toward said object, and said inner surface reflecting the

light generated by said illuminant extends to a backside of said illuminant with respect to the direction toward said object.

20. (Currently Amended) The [[lamp]] heating unit as claimed in claim 38, wherein said illuminant is positioned so as to emit the light to travel in a direction perpendicular to said projection face.

21. (Currently Amended) The [[lamp]] heating unit as claimed in claim 20, further comprising an electrode part to which an electric power is supplied and connected to said illuminant, wherein said illuminant comprises a filament coil electrically connected to said electrode part and said filament coil is positioned parallel to said projection face.

22. (Currently Amended) The [[lamp]] heating unit as claimed in claim 19, wherein said illuminant is configured and arranged to be a surface light-source when said lamp is viewed in a direction perpendicular to said projection face.

23. (Currently Amended) The [[lamp]] heating unit as claimed in claim 19, wherein said inner surface comprises a reflective film.

24. (Currently Amended) The [[lamp]] heating unit as claimed in claim 23, wherein said reflective film is a film containing at least gold.

25. (Currently Amended) A heat treatment apparatus for applying a heat treatment to an object to be processed, the heat treatment apparatus comprising:

a support member on which the object to be processed is placed; and

a heating unit having a plurality of lamps located above said support member for heating the object to be processed, each of said lamps comprising: including an illuminant generating a light[[;]] and an inner surface covering the illuminant so as to reflect the light generated by the illuminant; and

~~a projection face through which the light generated by the illuminant and the light reflected by said inner surface are projected,~~

~~wherein said inner surface of said light-emitting part has a curvature so as to reflect the light generated by said illuminant in a direction toward said projection surface~~

object, and said inner surface reflecting the light generated by said illuminant extends to a backside of said illuminant with respect to the direction toward said object.

26. (Withdrawn) A lamp for heating an object to be processed, the lamp being configured and arranged to be supported and cooled by a lamp support part, the lamp comprising:

a light-emitting part emitting a light so as to heat the object to be processed; and

a reflector reflecting the light emitted by said light-emitting part toward the object to be processed,

~~wherein said light-emitting part and said reflector are detachably attached to the lamp support part.~~

27. (Withdrawn) The lamp as claimed in claim 26, wherein said reflector is configured and arranged to be attached to the lamp support part and separable from said light-emitting part.

28. (Withdrawn) The lamp as claimed in claim 26, wherein said reflector has a hemispherical shape or a circular cone shape.

29. (Withdrawn) The lamp as claimed in claim 26, wherein said reflector comprises an aluminum body and a reflective film formed on a surface facing said light-emitting part, said reflective film including a nickel layer and a gold layer or a nickel layer, a gold layer, a rhodium layer and a gold layer provided on said surface of said aluminum body sequentially in that order.

30. (Withdrawn) The lamp as claimed in claim 26, wherein said reflector is configured to reflect an infrared light and a visible light.

31. (Withdrawn) A heat treatment apparatus for applying a heat treatment to an object to be processed, the heat treatment apparatus comprising:
a support member on which the object to be processed is placed;
a lamp support part located above said support member; and
a lamp attached to said lamp support part for heating the object to be processed,
the lamp comprising:
a light-emitting part emitting a light so as to heat the object to be processed; and

a reflector reflecting the light emitted by said light-emitting part toward the object to be processed,

wherein said light-emitting part and said reflector are detachably attached to said lamp support part.

32. (Withdrawn) The heat treatment apparatus as claimed in claim 31, wherein said reflector is configured and arranged to be attached to the lamp support part and separable from said light-emitting part.

33. (Withdrawn) The heat treatment apparatus as claimed in claim 31, wherein said reflector has a hemispherical shape or a circular cone shape.

34. (Withdrawn) The heat treatment apparatus as claimed in claim 31, further comprising an electrode part to which an electric power is supplied and connected to said light-emitting part, wherein said lamp support part comprises:

a first cooling part for cooling said reflector and said light-emitting part; and
a second cooling part for cooling said electrode part.

35. (Withdrawn) The heat treatment apparatus as claimed in claim 31, further comprising an electrode part to which an electric power is supplied and connected to said light-emitting part, wherein the electric power supplied to said electrode part differs depending on positions corresponding to the object to be processed.

36. (Withdrawn) The heat treatment apparatus as claimed in claim 31, wherein said light-emitting part has reflecting means for reflecting the light toward the object to be processed.

37. (Withdrawn) The heat treatment apparatus as claimed in claim 36, wherein said reflector and said reflecting means together form a hemispheric shape of a circular cone shape.

38. (Currently Amended) The [[lamp]] heating unit as claimed in claim 19, further comprising a projection face through which the light generated by the illuminant and the light reflected by said inner surface are projected.

39. (Currently Amended) The [[lamp]] heating unit as claimed in claim 19, wherein said inner surface forms a hemispherical shape or a semiellipsoidal shape.

Claim 40 (Canceled).

41. (Currently Amended) The [[lamp]] heating unit as claimed in claim 25, wherein said inner surface comprises a reflective film.

42. (Currently Amended) The [[lamp]] heating unit as claimed in claim 41, wherein said reflective film is a film containing at least gold.

43. (Currently Amended) A ~~lamp adapted to be used as a heat source~~ heating unit for heating an object to be heated, the [[lamp]] heating unit comprising:

a plurality of lamps used as a heat source;

a lamp support part supporting the lamps;

an illuminant generating a light; and

a reflective part reflecting the light generated by the illuminant,

wherein said reflective part has a face so as to emit the light generated by said illuminant in a direction toward said object by one time reflection, and said inner surface reflecting the light generated by said illuminant extends to a backside of said illuminant with respect to the direction toward said object.

44. (Currently Amended) The [[lamp]] heating unit as claimed in claim 43, wherein said reflective part has a curved surface.

45. (Currently Amended) The [[lamp]] heating unit as claimed in claim 44, wherein said reflective part has a hemispherical surface or a semiellipsoidal surface.

46. (Currently Amended) The [[lamp]] heating unit as claimed in claim 43, wherein said reflective part has a conical surface.

47. (Currently Amended) The [[lamp]] heating unit as claimed in claim 43, wherein said inner surface comprises a reflective film.

48. (Currently Amended) The [[lamp]] heating unit as claimed in claim 47, wherein said reflective film is a film containing at least gold.

49. (Currently Amended) A heat treatment apparatus for applying a heat treatment to an object to be processed, the heat treatment apparatus comprising:
a support member on which the object to be processed is placed; [[and]]
a heating unit having a plurality of lamps located above said support member for heating the object to be processed, each of said lamps ~~comprising~~: including an illuminant generating a light;
a reflective part reflecting the light generated by the illuminant; and
a projection face facing the illuminant so as to project the light emitted from the illuminant and the light reflected by the reflective part,
wherein said reflective part has a face so as to emit the light generated by said illuminant toward said projection face object by one time reflection, and said reflective part extends to a backside of said illuminant opposite to said projection face.

50. (Previously Presented) The heat treatment apparatus as claimed in claim 49, wherein said reflective part comprises a reflective film.

51. (Previously Presented) The heat treatment apparatus as claimed in claim 50, wherein said reflective film is a film containing at least gold.

52. (Currently Amended) The [[lamp]] heat treatment apparatus as claimed in claim 49, wherein said reflective part has a hemispherical surface or a semiellipsoidal surface.

53. (Currently Amended) The heat treatment apparatus as claimed in claim 49, further comprising a temperature control part provided around said lamps so as to control a temperature of said lamps, wherein said temperature control part is a cooling part for cooling each of said lamps.

54. (Currently Amended) A lamp adapted to be used as a heat source heating unit for heating an object to be heated, the [[lamp]] heating unit comprising:
a plurality of lamps used as a heat source, each of the lamps having a light-emitting part;
a lamp support part supporting the lamps; and
a light-emitting part; and
an electrode part configured and arranged to be supplied with an electric power and connected to said light-emitting part via a middle part located between said light-emitting part and said electrode part,
wherein said light-emitting part comprises:
an illuminant generating a light, the illuminant being connected to said electrode part;
a reflective part having a face so as to emit the light generated by said illuminant substantially in the same direction by one time reflection; and

a projection face facing said illuminant so as to project the light emitted from the illuminant and the light reflected by the reflective part toward outside the object, and said reflective part extends to a backside of said illuminant opposite to said projection face.

55. (Currently Amended) The [[lamp]] heating unit as claimed in claim 54, wherein said reflective part comprises a reflective film.

56. (Currently Amended) The [[lamp]] heating unit as claimed in claim 55, wherein said reflective film is a film containing at least gold.

57. (Currently Amended) The [[lamp]] heating unit as claimed in claim 54, wherein said reflective part has a hemispherical surface or a semiellipsoidal surface.

58. (Previously Presented) The heat treatment apparatus as claimed in claim 8, wherein said lamp house includes a temperature control part provided around said lamps so as to control a temperature of said lamps.

Claim 59 (Canceled).

60. (Currently Amended) The heat treatment apparatus as claimed in claim 25, further comprising a temperature control part provided around said lamps so as to

control a temperature of said lamps, wherein said temperature control part is a cooling part for cooling said lamps.

Claim 61 (Canceled).

62. (Previously Presented) The heat treatment apparatus as claimed in claim 8, further comprising a plurality of third lamps and a plurality of fourth lamps, wherein said second lamps are located at positions corresponding to an outer fringe of the object to be processed, said third lamps are located on an outer side of said second lamps, and said fourth lamps are located on an inner side of said second lamps.

63. (New) The heating unit as claimed in claim 1, wherein said inner surface forms a hemispherical or a semiellipsoidal shape.

64. (New) The heating unit as claimed in claim 19, wherein said inner surface faces said illuminant without any constituent part of said lamp therebetween.

65. (New) The heat treatment apparatus as claimed in claim 25, wherein said inner surface faces said illuminant without any constituent part of said lamp therebetween.

66. (New) The heating unit as claimed in claim 43, wherein said inner surface faces said illuminant without any constituent part of said lamp therebetween.

67. (New) The heat treatment apparatus as claimed in claim 49, wherein said inner surface faces said illuminant without any constituent part of said lamp therebetween.

68. (New) The heating unit as claimed in claim 54, wherein said inner surface faces said illuminant without any constituent part of said lamp therebetween.

69. (New) The heating unit as claimed in claim 19, wherein each of said lamps further includes an electrode part having electrodes connected to said illuminant to supply an electric power thereto, and wherein said heating unit further comprises:

 a first cooling part arranged between said lamps in said lamp support part so as to cool said inner surface; and

 a second cooling part provided in said lamp support part so as to cool said electrode part.

70. (New) The heat treatment apparatus as claimed in claim 25, wherein each of said lamps further includes an electrode part having electrodes connected to said illuminant to supply an electric power thereto, and wherein said heat treatment apparatus further comprises:

 a first cooling part arranged between said lamps in said lamp support part so as to cool said inner surface; and

a second cooling part provided in said lamp support part so as to cool said electrode part.

71. (New) The heating unit as claimed in claim 43, wherein each of said lamps further includes an electrode part having electrodes connected to said illuminant to supply an electric power thereto, and wherein said heating unit further comprises:

a first cooling part arranged between said reflective parts in said lamp support part; and

a second cooling part provided in said lamp support part so as to cool said electrode part.

72. (New) The heat treatment apparatus as claimed in claim 49, wherein each of said lamps further includes an electrode part having electrodes connected to said illuminant to supply an electric power thereto, and wherein said heat treatment apparatus further comprises:

a first cooling part arranged between said reflective parts in said lamp support part; and

a second cooling part provided in said lamp support part so as to cool said electrode part.

73. (New) The heating unit as claimed in claim 54, wherein each of said lamps further includes an electrode part having electrodes connected to said illuminant to supply an electric power thereto, and wherein said heating unit further comprises:

a first cooling part arranged between said reflective parts in said lamp support part; and

a second cooling part provided in said lamp support part so as to cool said electrode part.